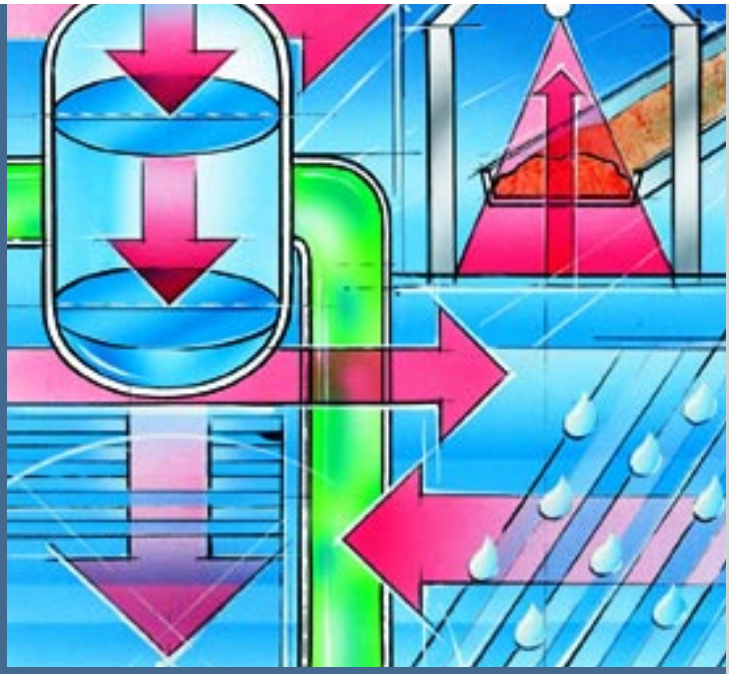

CONTACTLESS MEASUREMENT

berthold

Radiometric Process Measurement

PerkinElmer™
instruments.

Advantages of the Radiometric Process Measurement Principle

Radiometric process measurement is particularly interesting for the application of its **non-contact** measurement principle. A non-contact process measurement arrangement is **maintenance free,** allows no wear of the system components and is unaffected by extreme process conditions. Such a non-intrusive process measuring system may **easily be fitted** to existing plants with no or only minor mechanical modifications. The radiometric principle ensures that the measurement is unaffected by the physical or chemical properties of the product to be measured. The **reliability and quality** of the **Berthold** measuring instrumentation ensure exacting performance and exceptional repeatability and stability under all process conditions, complemented by a distinctive **long system life.**

Reliable Signal Conditioning A high level of immunity to external interference is guaranteed by the use of FSK modulation for the signal transmission between detector and signal processing unit. The signal transmission and power supply of the detector occur via 2-wire technique, resulting in **minimal cabling requirements** . The development of 'intelligent' detectors has improved the **reliability** of measuring systems through **integrated self checks** and control in the detector. A 32-bit processor technology ensures high signal processing speeds as are required for **on-line** signal conditioning. Basic settings and all calibration data are **stored** in FLASH memory. Menu driven programming dialog with soft keys allows **simple and convenient operation** of the evaluation unit. The systems are designed as compact 19"-rack units (21 TE, 3 HE). The evaluation unit used for the monitoring of level alarms is matched to the special requirements thereof.

Density Measurement

- Chemical
- Petrochemical
- Power Plants
- Cement, Ceramics
- Food
- Coal
- Iron & Steel
- Pulp & Paper

Non-contact, continuous density and concentration measurement is possible on pipes from 21 mm to over 1000 mm in diameter, as well as on vessels. The measurement is unaffected by colour, viscosity, conductivity and chemical properties of the product. The mounting of the measuring instrumentation is either to the outside of existing pipes (fig. 1) or integrated in the pipe works, especially for smaller pipe diameters, via a spool piece (fig. 2). An approved measuring section with Am-241 as gamma radiator may be utilised for specialised applications. An exceptional long term stability is assured via electronic compensation for drift and temperature influences.

Level Measurement

- Chemical
- Petrochemical
- Glass
- Cement
- Food
- Coal
- Iron & Steel
- Pulp & Paper

The indication of continuous level and the monitoring of alarm levels is realised through the non-contact measurement principle. External, non-intrusive arrangements allow uncomplicated measurement on high-pressure vessels or those containing corrosive products. Various configurations are available for continuous level measurement, which are suitably arranged around a specific vessel. The arrangement with rod source and point detector with NaI scintillation crystal (fig. 3) offers a linear process signal through the custom activity distribution on the rod source. Alternatively an arrangement with a rod detector with plastic scintillation material and a point source (fig. 4) may be chosen. For the monitoring of alarm levels a system consisting of point source and Geiger Müller counter tube (fig. 5) is available. A microprocessor controlled relay module in 19"-rack technology produces the desired signal evaluation for the level alarm.

Bulk Solids Mass-Flow Measurement

- Chemical
- Mining
- Cement, Ceramics
- Food
- Coal
- Iron & Steel
- Pulp & Paper

The uncomplicated retro-fitting of mass-flow measurement systems for bulk solids is achieved by installing a measuring frame (fig. 6) to existing mechanical conveying systems. The non-contact measurement principle and the lack of moving parts in this system ensure that measurement occurs without any wear to the system components. The space requirement for installation is minimal while no 'straight runs' of the conveying system have to be considered. 'Free fall' applications (fig. 7) at suitable breaks in the conveying system are possible. The determination of the mass-flow of bulk solids is also realised via non-contact, on-line measurement principles.

Neutron Moisture Measurement

- Chemical
- Mining
- Cement, Ceramics
- Sand
- Coke
- Iron & Steel
- Pulp & Paper

For the continuous determination of moisture in bulk solids the method of moderation of neutrons is used. This is realised either by installing a bunker probe (fig. 8) in the vessel or by mounting a surface probe (fig. 9) to the wall of the vessel containing the product to be measured. A representative moisture signal is established by the detection of all water molecules in the large volume measured, irrespective of their physical or chemical bond. Colour, temperature, pressure, pH value or other electrolytic components in the product do not have any effect on the moisture measurement.

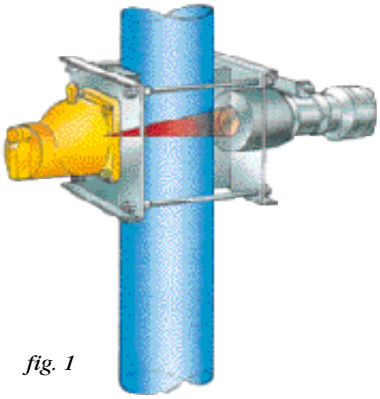

fig. 1

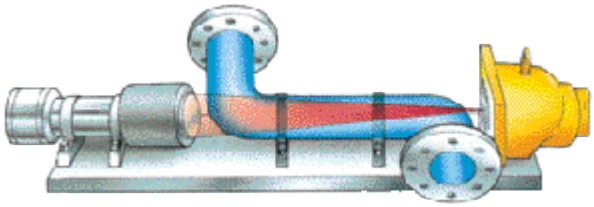

fig. 2

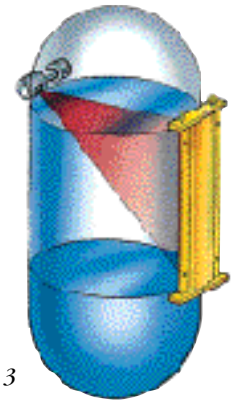

fig. 3

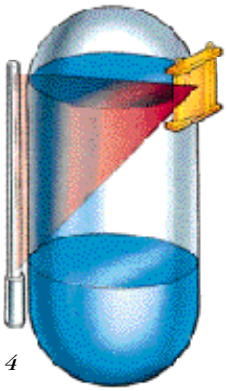

fig. 4

fig. 5

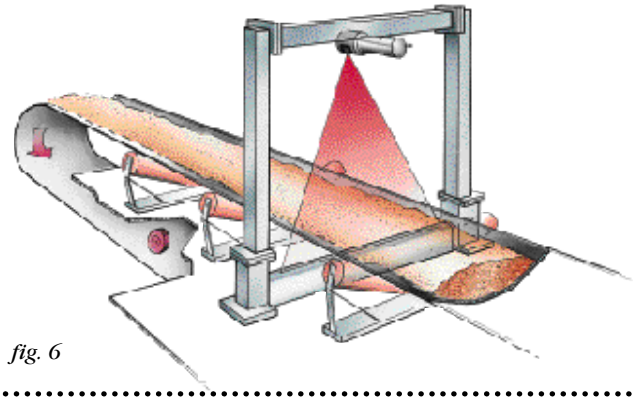

fig. 6

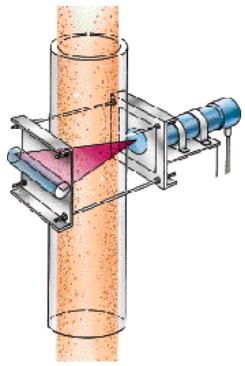

fig. 7

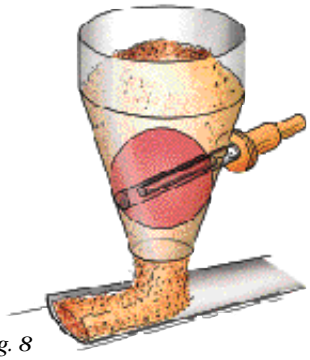

fig. 8

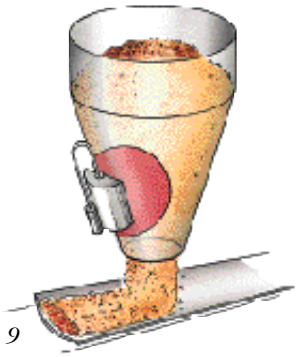

fig. 9

Density Measurement

Density and concentration measurement of lyes, acids, saline and other solutions, starch, sugar, milk etc., control of conversion processes like polymerisation or crystallisation, determination of solids content of slurries in the ore and mineral extraction industry, as well as flue gas de-sulphuring plants.

Level Measurement

Continuous measurement of level and the monitoring of alarm levels of liquids and bulk solids. Applicable for measurement on vessels and bunkers, e.g. storage tanks, hot-storage bunkers, vessels with agitators, high-pressure reactors, cyclones, etc.

Bulk Solids Mass-Flow Measurement

Determination of the mass-flow of bulk solids on various mechanical conveying systems like belt conveyors, screw conveyors, chain conveyors, etc. Similarly a 'free fall' determination of the mass-flow is possible on vertical pipes, ducts or suitable breaks in a conveying system.

Neutron Moisture Measurement

Moisture measurement on bulk solids like the measurement of sand moisture in the cement or glass industry or on calcareous sandstone. Or the determination of the moisture of coke and sinter mixtures.

Engineering Data

Density Measurement

Following technical data is required:

- density range
- product temperature range
- for suspensions: solid matter density, liquid density, min./max. density
- for liquids: measuring range in kg/m^3, min./max.
- concentration, chemical formula, if possible
- required accuracy
- external diameter of the pipe
- wall and material thickness, lining (if any)
- reference to possible gas pockets at the measuring point.

Bulk Solids Mass-Flow Measurement

Following technical data is required:

- the type and profile of the conveyor system
- typical mass flow rate (min./max./normal)
- the product being conveyed, particle size
- typical loading depth
- product speed (min./max./normal)
- required accuracy

Level Measurement

Following technical data is required:

- type and dimensions of the vessel
- thickness, material and density of any wall to be irradiated
- size and position of the required measuring range
- density and special properties of the medium in vessel
- gas density under operating conditions in high pressure systems
- maximum speed of level variations
- ambient temperature at the detector
- agitators or other internals, if any

Neutron Moisture Measurement

Following technical data is required:

- type and chemical composition of product
- measuring range
- crystal water content (min./max./normal)
- bulk density (min./max./normal)
- required accuracy
- product temperature range
- grain size distribution
- vessel size and position of measurement

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